EXHIBIT 1
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Renewable Energy Opportunities in Montana

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Overview

Renewable Energy Opportunities
- Conservation/Efficiency
- Combined Heat and Power
- Wind
- Solar Electric
- Methane
- Woody Biomass

Barriers

Possible Actions

What We Use

Total Electric Consumption in Montana
- 14,016 GWh Annually (MT DEQ 2005)

Nameplate Capacity

50% Coal

47% Hydro

3% Wind

Percentages Updated to Reflect Judith Gap and Great Falls

Conservation/Efficiency

Generally
- Most Important
- Least Sexy
- Cost Effective

Problem: High Capital Cost
Need for More Education

4,615 GWh potential in Montana by 2020, at 2 cents per kwh, that is 23.9% of the energy we use -

According to Western Resource Advocates "Assessing the Potential for Diversified Energy Resources in the Interior West"

Combined Heat and Power

Distributed – On homes and businesses

Compare 35% efficiency of central station coal to 80%+ efficiency of distributed CHP

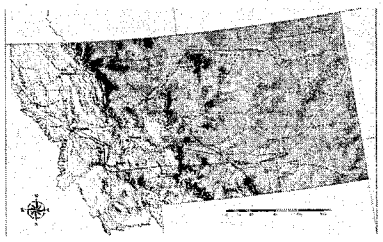
Can be biomass fueled

Problem: High Capital Cost

1,092 MW of potential CHP in Montana – Estimated 4,782 GWh

Wind

144 MW+ Currently in the state (468 GWh)
Estimated 900 MW under development (3,075 GWh)
Potential (WRA) 1020,000 GWh/yr



Wind

Distributed – On homes and businesses
Central Station Wind
Problems: High Capital Cost
Transmission Constraints
Intermittent Resource
Load Following Hard to Get
Tax Incentives Herky-Jerky

Solar Electric

Distributed – On homes and businesses
Potential 101,000 GWh Annual (WRA)
Most Utilities offer Some Kind of Net Metering
Problems: High Capital Cost
Other Countries and States offer More Incentive (69% of world supply goes to Germany and Japan, 9% to US)
Silicon in Short Supply

Methane

Distributed – Waste Water, Animal Waste, Food Waste, landfills
Potential (?) GWh Annual
Some WWTPs use methane for heating

Problems: High Capital Cost

Woody Biomass

Distributed – On homes and businesses
fuels for Schools
Potential 6,000 GWh Annual (WRA)
Technologies: Direct Combustion, Gasification, Pyrolysis,
Problems: High Capital Cost
New??? Technologies

Opportunity Summary

Total Electric Consumption in Montana 14,016 GWh Annually

Conservation 4,615 GWh
CHP 4,782 GWh
Wind 1,020,000 GWh
Solar 101,000 GWh
Woody Biomass 6,000 GWh

Potential 81 times as great as current consumption

Benefits of Renewables and Conservation

- No Emissions
- No Fuel Use
- No Water Use
- No Wastes
- No Water Pollution
- More Local Jobs
- High Wage Jobs
- Second Crop for Farmers
- Lower Energy Bills

Barriers

- High Capital Cost
- High Cost of Fossil Fuel is Hidden
- Failure to Account for Environmental Benefits of Renewable Energy
- Some Technologies not Fully Developed
- Transmission Constraints
- Intermittent Resource – Firming

Possible Actions

- Increase Incentives for Efficiency Improvements and Renewable Energy Generation
- Better Educate People on Benefits and Techniques of Conservation and Renewables
- Quantify Economic Benefit Value of Renewables so the Economists Won't Ignore Them
- Develop New Sources of Load Following/Reserve Electric Capacity